DEPARTMENT OF THE ARMY
WASHINGTON AQUEDUCT
U.S. ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
5900 MACARTHUR BOULEVARD, N.W.
WASHINGTON, D.C. 20016-2514

February 12, 2016

Office of the General Manager

Mr. Andrew Seligman (3WP42)
NPDES Enforcement Branch
Water Protection Division
U.S. Environmental Protection Agency
1050 Arch Street
Philadelphia, PA 19103-2029

RE: INFORMATION REQUIREMENT, Section 308 of the Clean Water Act, 33 U.S.C. Section 1318 to Washington Aqueduct, 5900 MacArthur Boulevard, Washington, DC 20016, Baltimore District, US Army Corps of Engineers

Dear Mr. Seligman:

The following information is submitted in accordance with the subject request for information letter dated January 6, 2016. Your questions are in bold and our response are below those.

"An estimated mass of solids that have been deposited, dredged or accumulated in Georgetown Sedimentation Basin #1 and #2 since the completion of cleaning in February 2015."

Mr. Alexander Gorzalski and Mr. Mel Tesema were consulted in order to calculate an estimate of the solids deposited and removed from the Georgetown Sedimentation basins. Mr. Tesema is the chief of Washington Aqueduct's Plant Operations Branch. Mr. Gorzalski is an environmental engineer working under Mr. Tesema's direction.

The attached memorandum prepared by Mr. Gorzalski and the graph attached to that memorandum describe the methodology and the result of the analysis. As I will explain below, the dredges were inoperable since approximately August 1, 2015 due to the discovery of frayed cables which necessitated contracting for a company to replace them.

As of January 2016, we estimate that about 4.7 million pounds were deposited in the two basins since basin #2 was drained in December 2014 and basin #1 was drained in February 2015. Because of the limited dredging due to the cable failure, currently we estimate that, approximately 4.0 million pounds of residuals are currently in the brains.

"A status update on modifications or improvements made to the sediment removal barges that ensure adequate removal of solids deposited in the Georgetown Sedimentations Basins."

Washington Aqueduct is confident that long-term it will be able to achieve and sustain the adequate removal of solids from the Georgetown Sedimentation basins. As we have described in the letters requiring bypass permission, there has been significant difficulty in operating the dredges to their

design capability. Since February 2015, there has been a concerted effort among the consultants, the Washington Aqueduct engineers and the individuals operating the dredges to learn how best to execute the daily collection menus to retrieve solids. As you may note from the attached graph, significant collection was achieved in April, May, June and July 2015. As this improvement in performance was occurring we discovered that the cable that the dredge pulls itself along began to fray at the limits of the dredge's travel path. We evaluated this as an unsafe condition and we stopped the dredging and initiated a project to replace this cable on both basin #1 and basin #2.

There was a three month delay to meet additional contractual requirements. The ordering of the non-standard materials has further delayed getting the dredge back into operation. The repair contractor is on site, and within the next three weeks should have the new cables installed and the dredges tested. We determined that the fraying was caused by failure of the sensor to detect that the dredge was at the limit of travel path. During the testing period we will ensure that these sensors are functioning properly, and we will closely monitor this function during the subsequent dredging operations.

To increase production we are reassigning the daily operation of the dredges to a team of individuals who will be working alongside the operating shift. We expect to extend the hours of dredging each day and to work on the weekends. During winter there will be times when ice forms on the basins and the dredges must be docked. However we calculate that the capacity of the dredges and available dredging hours will allow us to catch-up. The desired outcome is to have no build up in the area covered by the dredges.

Given the shape of the basins (i.e., not rectangular, sloped slides and slopping bottom) there are some areas that will need supplemental dredging. To deal with that we are issuing a contract for a separate dredging contractor to remove the solids that accumulate outside the footprint of the automated dredges. We are prepared to have that done regularly.

Per your request, Washington Aqueduct will send monthly updates by the end of each calendar month. We propose that these reports reflect activities from the 15th of the previous month to the 15th of the reporting month.

I certify that the information contained in or accompanying this submission to be true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I certify as having responsibility for the persons who, acting under my direct instruction, made the verification that is information is true, accurate, and complete.

Sincerely,

Thomas P. Jacobus
General Manager

Enclosure

TO: Mel Tesema
FROM: Alex Gorzalski
DATE: February 1, 2016
SUBJECT: Estimation of Solids Accumulation and Dredging in the Georgetown Reservoir

The purpose of this memo is to estimate the quantity of solids accumulated and dredged in the Georgetown Reservoir. This analysis is limited to the period beginning 23 December 2014 and ending 28 January 2016. This estimate represents a first attempt by POB; the maintenance and engineering branches should sign off in concurrence with these estimates and assumptions.

Solids accumulation in the Georgetown Reservoir was calculated using three parameters: average daily i) inflow (MGD), ii) raw water turbidity (NTU), and iii) alum set dose (lb/MG as $Al_2(SO_4)_3*14H_2O$). It was assumed that raw water contained 1 ppm (i.e., 1 mg/L) per 1 NTU of turbidity and that 0.44 lb of alum sludge was produced per lb of alum used. An example calculation is shown below for a hypothetical condition with 50 MGD flow, 10 NTU raw water turbidity, and 300 lb/MG alum dose.

$$Solids\ Deposition\ \left(\frac{lb}{day}\right) = \frac{50*10^6 gal}{day}\left[\left(\frac{1\ part}{10^6 parts*NTU} * 10\ NTU * \frac{8.34\ lb}{gal}\right) + \left(0.44 * \frac{300\ lb}{10^6 gal}\right)\right]$$

Deposition in Georgetown Basins 1 and 2 was considered collectively; the solids accumulation estimate does not attempt to distinguish which basin the solids settled in. This estimate assumes that 100% of solids were deposited in Georgetown Basins 1 & 2 (i.e., no carry over into Georgetown Basin 3 or the McMillan Reservoir). The estimated amount of residuals dredged from the Georgetown Reservoir is calculated in SCADA using signals from a flow meter and the density meter on each dredge.

The estimated amount of residuals deposited, dredged, and accumulated are shown in Figure 1 on the following page. It was estimated that approximately 2,000 tons of residuals accumulated in the Georgetown Reservoir between 23 December 2014 and 28 January 2016.

Numerous assumptions were used that will affect the accuracy of these estimates, including but not limited to the following:
- The assumption of 1 ppm of solids per NTU of turbidity and 0.44 lb of solids per lb of alum. There are no readily available data to demonstrate if this is true for Washington Aqueduct's raw water turbidity and alum reactions.
- Solids contribution from powdered activated carbon (PAC) and polyDADMAC coagulant aid polymer was assumed to be negligible
- The period of analysis includes some buildup in Basin #1 which was subsequently drained. However, since we cannot accurately estimate what portion of the flow went to Basin #1, it is assumed to have accumulated. This is makes the estimate more conservative (i.e., higher).
- All solids were assumed to settle in Basins 1&2 (i.e., no carry over into Basin 3 or the McMillan Reservoir). This is makes the estimate more conservative (i.e., higher).
- Dredge density meters were assumed to be properly calibrated.
- The SCADA calculation using dredge density and downstream flow meters was assumed to be accurate.

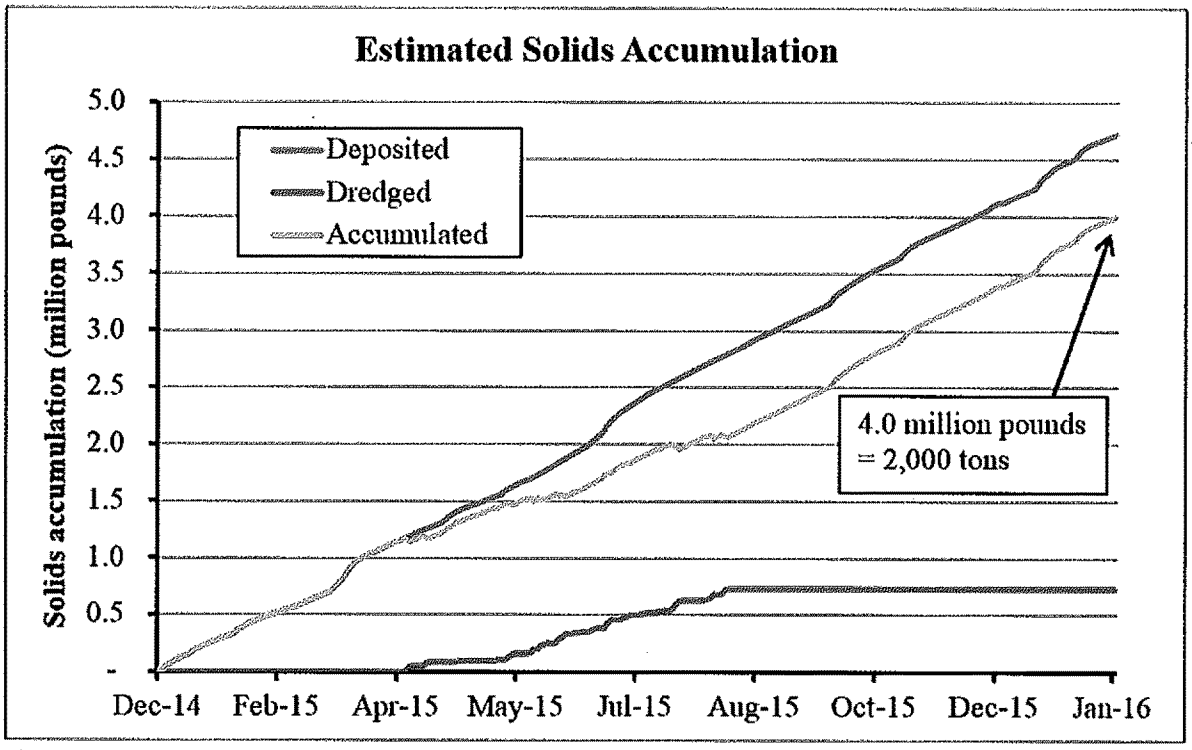

Figure 1. Estimated solids deposition, dredging, and accumulation in the Georgetown Reservoir.